

CHAPTER 1.2 - Receiving Water Used to Make WET Determinations

The purpose of this chapter is to aid in the selection of appropriate receiving waters for use in dilution ratios, IWC calculations, and dilution waters.

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Receiving Water Use in WET Determinations

Since the promulgation of chs. NR 105 and NR 106, Wis. Adm. Code, the WDNR has been reviewing WPDES permits for surface water dischargers to determine the need for WET testing to assess an effluent's potential for impairment of fish and aquatic life communities. Receiving water type, location, and available dilution are important factors that are considered when determining the appropriate WET requirements for a given situation. Since the magnitude of toxic effect usually increases as effluent concentration increases, one of the most important factors affecting WET potential is dilution. A very toxic effluent with an extremely large dilution may cause less environmental damage than a slightly toxic effluent with very little dilution. Since dilution and mixing are important considerations used to determine types of WET testing, the WET Checklist process described in Chapter 1.3 includes an evaluation of the relationship between stream flow and effluent flow for each discharge situation.

Generally, coldwater, warmwater sport fish, and warmwater forage fish classified waters (see s. NR 102.04(3)(a)-(c)), support a more diverse aquatic life community and warrant a higher level of protection. On the other hand, "variance" (limited forage fish and limited aquatic life) classified waters usually have minimal flows which would result in extremely stringent pass/fail criteria for WET tests. In recognition of these factors, the following approach is recommended which provides full protection from acute impacts to all waters, moderate protection from sub-lethal chronic impacts in most variance waters, and full protection from chronic impacts to all waters classified as coldwater, warmwater sport fish, or warmwater forage fish.

When completing the Checklist, it is important to use the appropriate effluent and receiving water flow information to calculate stream flow to effluent flow ratios ($Q_{7,10}:Q_e$) and instream waste concentrations (IWC). Since the aquatic communities that WET testing is designed to protect are always present in non-variance classified waters, the receiving water used for making chronic WET determinations should be the first waterbody that the effluent encounters which supports a coldwater, warmwater sport fish, or warmwater forage fish classification. Anytime that staff have information suggesting that one of these classifications is appropriate for the receiving water, chronic WET determinations should be made that will be protective of that community. In other words, even if the waterbody in question is listed in s. NR 104.05-10, Wis. Adm. Code, but Department staff have information suggesting that the correct designation of the waterbody should be a coldwater, warmwater sport fish, or warmwater forage fish (e.g., a stream has been evaluated and it has been determined that it should be "de-listed" or reclassified), then WET conditions like the IWC should be set using that receiving water. Staff should use their best professional judgment to select the appropriate receiving water to be used when making chronic WET determinations that will be protective of the appropriate aquatic life communities. Some example scenarios are illustrated at the end of this chapter.

In situations where the effluent is discharged into a variance water [see s. NR 102.04(3)(d)-(e)], the distance to the first non-variance waterbody (or the distance between the discharge and where the receiving water becomes non-variance) should be determined. When this distance is less than 4 miles, the receiving water flow to be used for chronic WET determinations should be that of the non-variance waterbody downstream of the confluence, minus the

effluent flow contributed by the discharger. If the distance to the non-variance waterbody is > 4 miles, chronic WET testing is not usually recommended, unless information is available that suggests a potential exists for impacts due to chronic toxicity (for example, if there have been chronic WET failures).

Once the appropriate waterbody has been selected, the same waterbody should be used for the stream flow to effluent flow ratio and IWC determinations. As specified in s. NR 106.06(3)(b)2, Wis. Adm. Code, when an effluent is discharged to a waterbody without unidirectional flow (e.g., lakes, bays, impoundments), the default $Q_{7,10}:Q_e$ ratio = 10:1 and the IWC = 9%. These defaults should also be used whenever a variance stream empties into a waterbody without unidirectional flow (e.g., when the first downstream non-variance waterbody is a lake). See Attachment 1 at the end of this chapter for some examples of appropriate receiving water use in different discharge situations.

Requirements For Discharges to Wetlands

All wetlands in the state are currently classified as variance waters. To determine the $Q_{7,10}:Q_e$ ratio and IWC for a facility that discharges to a wetland, staff should determine the point where the stream discharging from the wetland becomes a non-variance classification and use the flow characteristics at this point in WET determinations. If the wetland/stream does not change to a non-variance waterbody (or confluence with one within 4 miles), judgments similar to those discussed above should be made to determine which waterbody is most appropriate for use. To calculate the IWC for facilities that discharge to wetlands that do not then discharge to other surface waters, staff should treat the discharge similar to a lake situation, as described above (i.e., the $Q_{7,10}:Q_e = 10:1$, IWC = 9%).

Receiving Water Diluent in WET Tests

Correct identification of the appropriate receiving water is important since most permittees are required to use receiving water as the diluent in WET tests. Permit-required WET tests are intended to estimate the aggregate effect on receiving waters from all toxic contaminants in the effluent and the extent to which the chemicals are biologically available to aquatic organisms. For this reason, it is recommended that receiving water be used for dilution whenever possible. The *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition"* (Methods Manual) requires the use of receiving water as diluent (Section 4.4), because this increases the environmental relevance of WET testing by simulating effluent/receiving water interactions in the test. It may also improve the capacity of WET tests to predict in-stream effects.

As required by the Methods Manual (Section 4.4), a minimum of one representative grab sample of the receiving water is necessary for use with each WET test. The sample is usually collected upstream of the discharge, with every attempt made to avoid contact with the permittee's and all other discharges' mixing zones. Similarly, in situations where the waterbody that is discharged into becomes a non-variance waterbody within 4 miles downstream of the discharge, receiving water samples should be collected upstream of the discharge (again, avoiding contact with other known discharges).

For situations where a downstream non-variance waterbody was used for WET determinations, the receiving water sample should be collected from a site upstream of the confluence of the variance waterbody and the non-variance waterbody that was used in previous WET determinations. In situations where a lake, impoundment, bay, or other waterbody without unidirectional flow has been identified as the receiving water to be used for WET tests, every effort should be made to identify a receiving water sample location outside the influence of all known discharges.

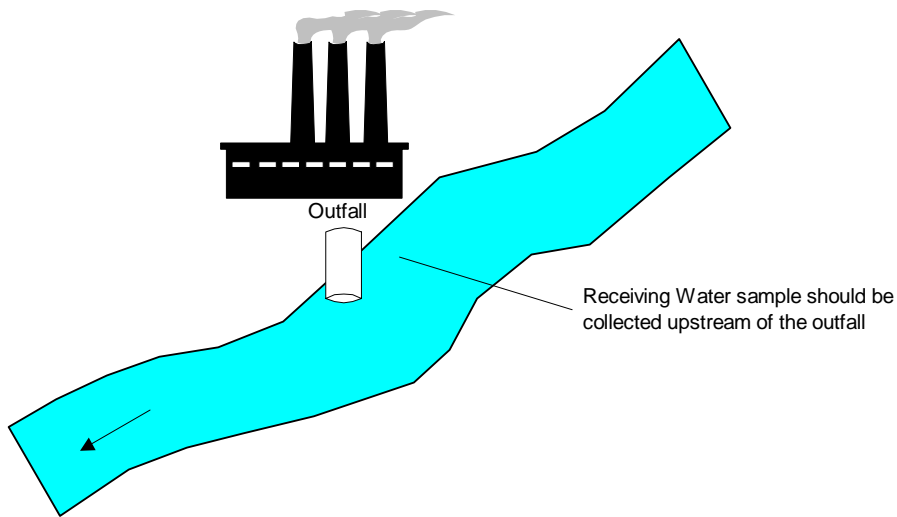
What if the Receiving Water isn't Available or Acceptable?

Under some conditions (e.g., lack of flow, icy conditions, etc.), it may be necessary to consider the use of different dilution waters. In situations where the receiving water cannot be used, the next best option is an alternate surface

water with similar natural conditions (i.e., same watershed, physical characteristics). If no alternate surface water can be identified, it may be necessary to use laboratory water for dilution. However, using lab water for dilution should be a last resort. Naturally occurring materials that tend to complex and detoxify some compounds are normally absent from lab waters, therefore tests using lab water may overstate effluent toxicity effects on the receiving water environment. (See Chapter 2.11 for more guidance regarding the use of alternate dilution waters.) **If alternate receiving waters or lab waters are to be used as diluent in a WET test, permit drafters should document the justification for this designation and place this documentation into the permit file.**

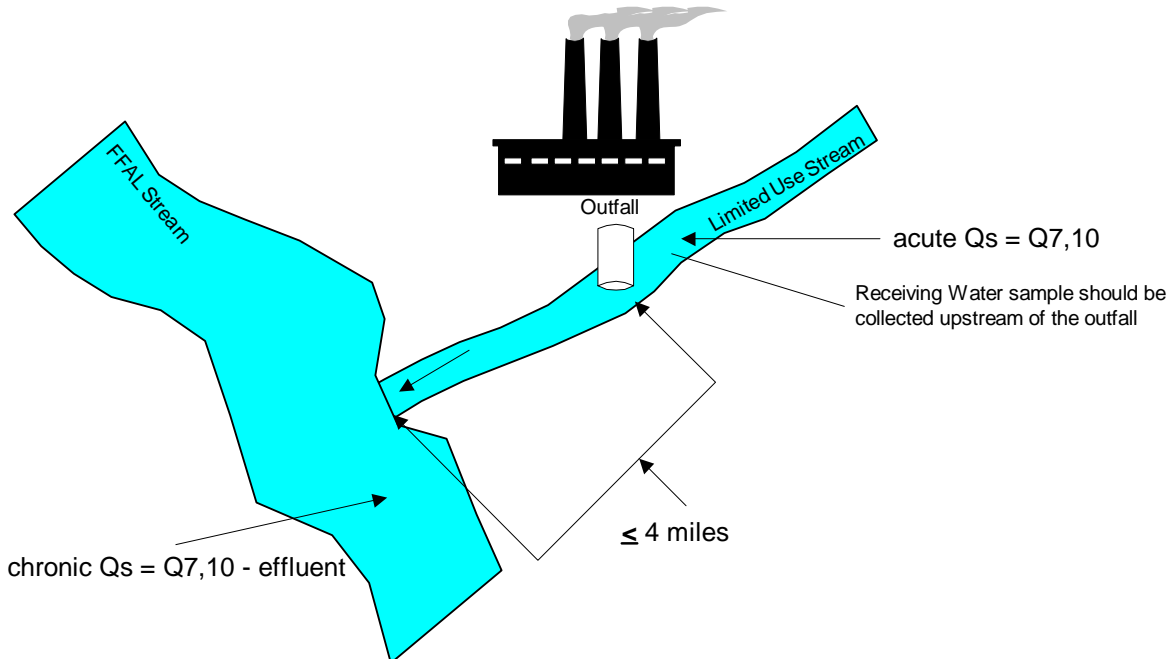
ATTACHMENT 1: Receiving Water Use Examples

Example #1: Fish and Aquatic Life (FFAL) Stream



acute & chronic Qs = Q7,10 of receiving water
Need for acute and chronic testing evaluated using the WET Checklist:
 $Q7,10:Q_e > 1,000:1$ No WET usually recommended
 $Q7,10:Q_e \leq 1,000:1$ & $> 100:1$, Acute WET only usually recommended
 $Q7,10 \leq 100:1$ Acute & Chronic testing recommended

Example #2: Limited Use Stream w/Upstream Flow



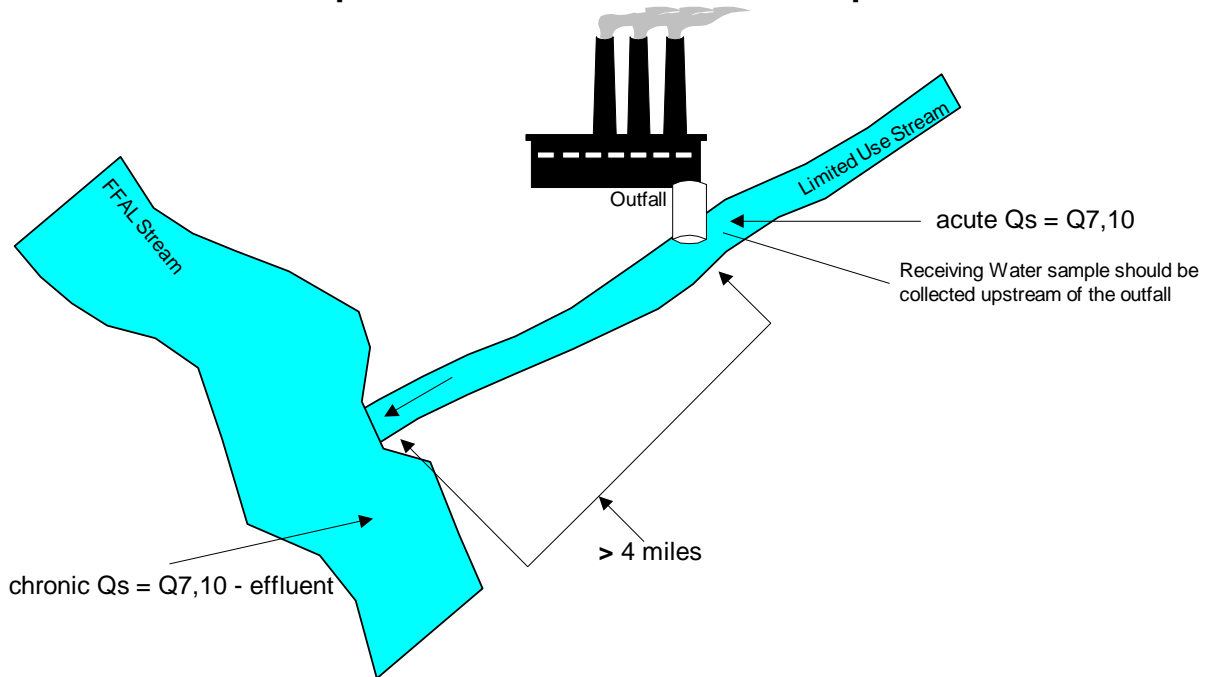
chronic Qs = Q7,10 of 1st downstream FFAL or higher
Need for acute and chronic testing evaluated using the WET Checklist:
 $Q7,10:Q_e > 1,000:1$ No WET usually recommended
 $Q7,10:Q_e \leq 1,000:1$ & $> 100:1$, Acute WET only usually recommended
 $Q7,10 \leq 100:1$ Acute & Chronic testing recommended

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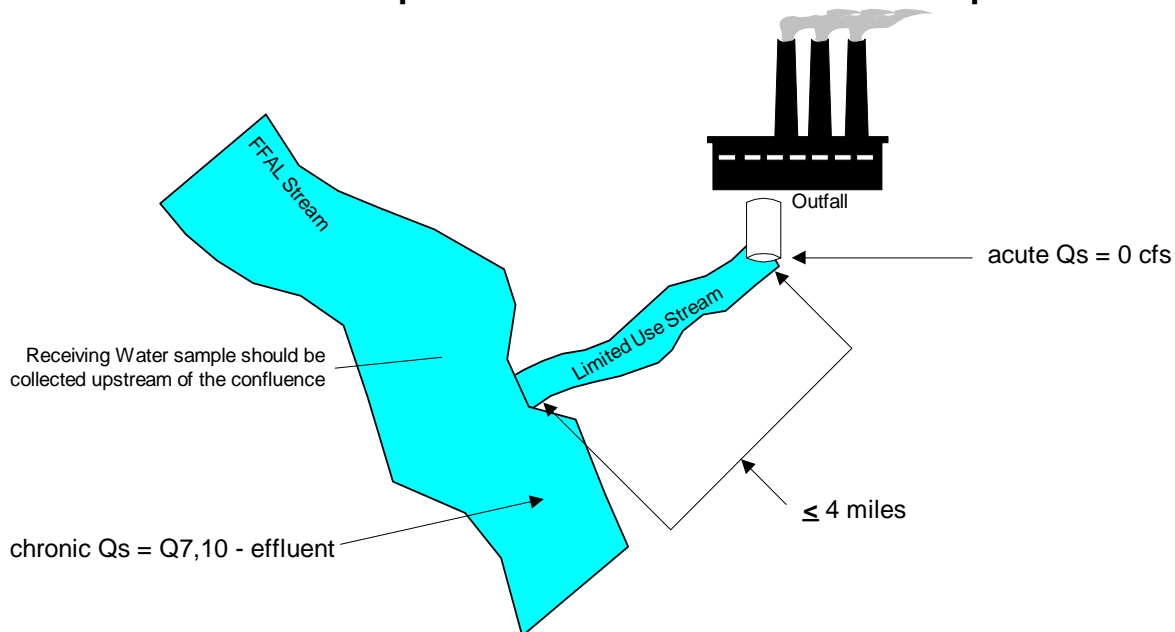
ATTACHMENT 1: Receiving Water Use Examples

Example #3: Limited Use Stream w/Upstream Flow



chronic Qs = Q7,10 of 1st downstream FFAL or higher
Need for acute and chronic testing evaluated using the WET Checklist:
Q7,10:Qe > 1,000:1 No WET usually recommended
Q7,10:Qe ≤ 1,000:1 Acute WET only usually recommended
No chronic recommended, unless historical toxicity problems are known.

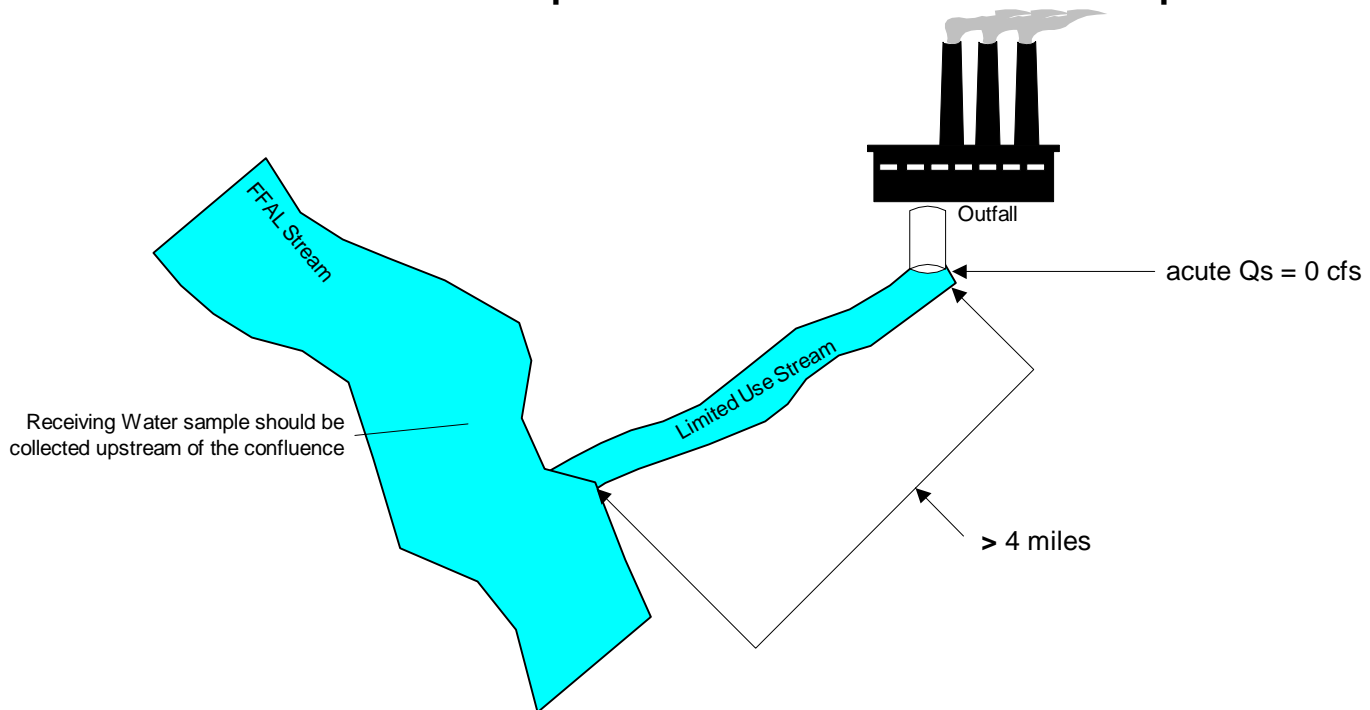
Example #4: Limited Use Stream w/No Upstream Flow



chronic Qs = Q7,10 of 1st downstream FFAL or higher
Need for acute and chronic testing evaluated using the WET Checklist:
Q7,10:Qe > 100:1, Acute WET only usually recommended
Q7,10 ≤ 100:1 Acute & Chronic testing recommended

ATTACHMENT 1: Receiving Water Use Examples

Example #5: Limited Use Stream w/No Upstream Flow



Need for acute and chronic testing evaluated using the WET Checklist:
Qs = 0 cfs Acute WET usually recommended
No Chronic testing recommended unless historical toxicity problems are known